Ontario

SuperBuild
Ministry of Transportation

# STRATEGIC TRANSPORTATION DIRECTIONS

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**DRAFT**

ONTARIO INTELLIGENT TRANSPORTATION SYSTEMS

## TRANSPORTATION PLANNING FOR THE FUTURE

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Throughout Ontario's history, transportation has played a key role in the province's economic and social well-being. The ability to move goods and people efficiently continues to be crucial to the province's society and economy, providing the essential links between communities, both large and small.

A safe, efficient and integrated transportation system also supports economic investment and promotes job creation. It contributes to the preservation of the environment and makes an important contribution to the overall quality of life for everyone who calls Ontario home.

Whether it is connecting remote areas to key economic markets, or getting millions of people to and from work every day, Ontario's transportation system is fundamental to the province's success.

The Ministry of Transportation of Ontario (MTO), in conjunction with the Ontario SuperBuild Corporation, is now looking toward the future of transportation in Ontario. To that end, a consultation on strategic transportation directions was recently conducted across the province, in support of the government's made-in-Ontario Smart Growth commitment to build a stronger economy, stronger communities and a healthy environment.

MTO has developed five draft *Strategic Transportation Directions* documents. The first four documents lay out strategies for each of four provincial regions: Northern Ontario, Eastern Ontario, Southwestern Ontario and Central Ontario. This document – the fifth in the *Strategic Transportation Directions* series – outlines the role of Intelligent Transportation Systems (ITS) in helping to achieve these transportation goals. ITS is about applying advanced technology to our transportation systems to make them safer and more efficient, and to help manage congestion.

The five *Strategic Transportation Directions* documents set out a course of action for transportation in Ontario, taking into account the different needs of the various regions. These *Strategic Transportation Directions* are based on extensive research, and include relevant factors such as Smart Growth principles, infrastructure decisions and announcements, transportation studies and other pertinent information.

### MTO's Transportation Planning Process

MTO's long-range planning process involves a number of steps, from Strategic Transportation Directions, to more detailed studies such as area transportation studies and corridor transportation studies. Once the need for a new provincial transportation facility is established, the ministry initiates the environmental assessment process, which looks at alternative routes, potential environmental impacts and how such impacts can be mitigated. If environmental assessment approval is received, the ministry may proceed with detailed designs and ultimately with the implementation of the new transportation facility.

ITS can fit into this planning process as long-term technological developments affect our underlying transportation service model. ITS also involves taking advantage of short- and medium-term opportunities that can improve existing facilities, often extending their life and making them safer and more efficient. Finally, ITS presents opportunities for partnerships, both with other public sector agencies and the private sector, as well as for independent private sector initiatives.

This *Strategic Transportation Directions* document focuses on Intelligent Transportation Systems. It is intended to:

- provide an overview of ITS and its current state of deployment in Ontario;
- identify factors affecting the future deployment of ITS; and
- set out a vision and a strategy for the province to use ITS to achieve its transportation goals.

This document is a starting point for discussions with stakeholders on the future deployment of Intelligent Transportation Systems in Ontario, in light of the government's Smart Growth objectives. This draft document will be refined after the completion of stakeholder consultations.

## GOALS AND OBJECTIVES

The *Strategic Transportation Directions* documents envisage an integrated transportation system in Ontario – a system that is safe, efficient, environmentally sensitive and accessible. The primary goal of the *Strategic Transportation Directions* process is therefore to develop a fiscally and environmentally sustainable transportation system that will foster economic development while addressing the needs of transportation users, industry and the public.

Ontario's Regions

MTO has identified a number of specific objectives under four key themes that form the basis for its approach to *Strategic Transportation Directions*:

### *Fiscal Management*

- Maximize use of existing facilities.
- Consider innovative approaches to financing improvements to transportation systems and services.
- Promote and support efficient and cost-effective transportation systems.

### *Economic Development*

- Support provincial and regional economic development through the efficient movement of people and goods.
- Support the economic competitiveness of Ontario industry, including resource industries and tourism.
- Promote the integration of transportation systems.
- Support the efficient operation of international and interprovincial trade corridors and gateways.

### *Safety and User Needs*

- Recognize the need for mobility through the development of an integrated transportation system that is safe, efficient and provides reasonable choice and accessibility.
- Include safety as an important element in all aspects of transportation.
- Provide appropriate transportation choices to travelers.

### *Environmental Quality*

- Support Smart Growth principles related to land use.
- Promote a balanced transportation system that reduces energy consumption and vehicle emissions.

These objectives are reflected in all Ministry of Transportation initiatives as part of the *Strategic Transportation Directions* process.

## STAKEHOLDER CONSULTATIONS

To gather feedback on the four draft *Regional Strategic Transportation Directions* papers, the Ministry of Transportation conducted a series of stakeholder consultations during January and February of 2002.

This consultation process included identifying transportation stakeholders in each region, conducting a series of workshops across the province, inviting input from the public, producing a document summarizing stakeholder input from each region, and refining the four regional *Strategic Transportation Directions* documents, based on the stakeholder input.

Recognizing that the Ministry of Transportation alone does not provide facilities and services for all modes of transportation – responsibility for much of the transportation system lies with the private sector and other levels of government – this consultation was seen as a way to bring together a range of transportation service providers, transportation client groups, and other stakeholders to discuss broad transportation issues that affect all regions and users in the province.

This draft *Strategic Transportation Directions: Intelligent Transportation Systems* document will also be used as the basis for stakeholder consultations.

### Transportation and Smart Growth

The Government of Ontario has made a strong commitment to Smart Growth – a vision for the province that promotes and manages growth to build a strong economy, strong communities and a healthy environment.

In developing a made-in-Ontario Smart Growth strategy, the government has identified the need to address and link decisions on issues such as transportation, infrastructure, land use, housing and public investment, to ensure that they are balanced with the hallmarks of Ontario's quality of life, such as parks and green space.

As an integral part of Ontario's Smart Growth strategy, transportation planning must address Smart Growth objectives, which include:

- promoting choices for travel within and between communities;
- moving people and goods efficiently;
- reducing gridlock in parts of the province that are experiencing high population and employment growth; and
- developing integrated transportation networks that promote access and economic activities.

MTO will be working closely with the Ministry of Municipal Affairs and Housing's Smart Growth Secretariat to support the government's Smart Growth initiative. As Smart Growth Panels are formed in each region, the Ministry of Transportation will provide ongoing input – including the Strategic Transportation Directions for each region – as foundation planning documents to assist in the development of Smart Growth strategies.

### Transportation and SuperBuild

The Ministry of Transportation is also working closely with the Ontario SuperBuild Corporation (SuperBuild), which is leading the largest infrastructure building program in Ontario's history, to develop new and innovative financing and public/private partnership approaches, to create new infrastructure to meet Ontario's transportation needs over the next 30 years.

In addition to numerous highway improvements, Ontario's SuperBuild commitment includes a 10-year, $9-billion plan to renew and expand public transit across the province.

Ontario's strong economy and high standard of living are based in part on a flexible, high-quality network of road, rail, air, marine, transit and related facilities and services – and each of these transportation modes has an important role to play. Because the transportation system as a whole plays such a vital role in the daily lives of millions of Ontarians, the provincial government has invested some $6.5 billion in transportation infrastructure since 1995.

With significant growth in Ontario's population and trade expected over the next 25 years, more investments will be needed to ensure that a safe, efficient transportation system remains a powerful social and economic asset.

Overall, the provincial goal is for a transportation system that is well balanced and well integrated – a system that allows people and goods to move safely and efficiently, within and across local and regional boundaries, and within and among the various transportation modes. But while integration remains the strategic goal, getting there presents some significant challenges.

The provincial highway network, for example, is one of the Ministry of Transportation's primary responsibilities. Similarly, other agencies and levels of government are responsible for other vital transportation modes and facilities in the province. For the most part, these transportation facilities are planned and operated independently.

Realizing the goal of a well balanced, well integrated network of transportation services will thus require greater cooperation and more coordinated planning among federal, provincial, regional and municipal government agencies, as well as among major air, rail, bus and transit operators, commercial trucking companies, and many other players.

Much of Ontario's anticipated economic and population growth over the next quarter-century is expected to take place in its largest urban centres, including the Golden Horseshoe, Ottawa and London. These large urban regions are not only vital to the economies of both Ontario and Canada, but also offer some special transportation challenges.

For example, numerous transit companies operate throughout the Golden Horseshoe – but with the exception of GO Transit, which is operated by the province, most transit operators only offer services within the boundaries of their home municipalities. Thus although commuters living across the region have access to a wide range of transportation services – by bus, subway, light-rail and passenger rail – the services and modes generally operate independently, and there is little coordination of fares, schedules or services.

### Ontario Government Commits $3.25 Billion to Transit

On September 27th, 2001, the Ontario government announced a 10-year, $9-billion investment plan for transit, $3.25 billion of which will be funded by the province.

Three programs are being implemented to deliver this provincial commitment. The Golden Horseshoe Transit Investment Partnerships (GTIP) initiative will provide up to $1.25 billion for expansion of inter-regional transit services in the Golden Horseshoe area. The Transit Investment Partnerships Program (TIP) will provide up to $250 million for expansion of inter-regional transit services outside the Golden Horseshoe. The Ontario Transit Capital Renewal Program will provide $750 million for fleet and capital renewal needs for Ontario transit services. In addition, the province has assumed the base capital and operating needs for GO Transit, involving a $1 billion commitment.

These initiatives demonstrate the province's commitment to Smart Growth by building a strong economy, strong communities and a healthy environment.

To the extent that this lack of coordination creates inconvenience for potential transit users, it discourages daily commuters from using mass transit. As a result, Ontario's transit companies are hampered from attracting new riders, and the region's environment and quality of life are impaired by auto-related pollution.

Another special transportation challenge facing Central Ontario is that some of the major highways in the GTA/Golden Horseshoe region frequently operate at – or even beyond – their original design capacity. This heavy demand often creates pressures that lead to congestion, and highway congestion is expensive. Not only does congestion have an adverse impact on our air quality and quality of life, but it also costs time and money – reducing productivity and competitiveness throughout the whole economy.

The key to realizing the vision of a truly integrated, well balanced system is to ensure that the various transportation modes are used as efficiently and effectively as possi-

life...and that the various multi-modal services provided by the system are closely tied to the services needed by its users. To meet the transportation challenges that lie ahead, Ontario has adopted a Smart Growth transportation strategy with three fundamental objectives:

- maintaining the vital transportation assets we have today;
- improving the efficiency of the system where possible; and
- expanding the system where necessary.

The Government of Ontario is committed to policies that encourage Smart Growth, to build a strong economy, create strong communities and maintain a healthy environment. With significant growth expected in Ontario's population and economy over the next 25 years, a corresponding increase can be expected in transportation demand. The province's challenge is thus to use every available tool to manage the system effectively.

To achieve the goals of Smart Growth, Ontario needs to get the most from its existing transportation infrastructure, at the same time as it plans and builds the new, smarter infrastructure that will be needed in the future. In this regard, Intelligent Transportation Systems (ITS) are expected to play an increasingly important role.

Intelligent Transportation Systems apply computer, communications and/or electronics sensor technologies to surface transportation. When used effectively, ITS can lead to new ways of understanding, operating, expanding, refining, configuring, managing and using the transportation system.

In Ontario and abroad, Intelligent Transportation Systems have demonstrated their ability to save lives while improving the levels of service and efficiency in transportation systems. When ITS is applied effectively:

- transit users can move within and across jurisdictions seamlessly;
- transit operators can improve service and reduce costs;
- travellers can rely on faster emergency support;
- people can plan trips more effectively; and
- existing roadways can accommodate a higher volume of traffic.

Through tools such as the *ITS Architecture for Canada*, Intelligent Transportation Systems make it easier for transportation agencies and the private sector to cooperate on more effective ways of delivering transportation services. For example, ITS permits linkages between parts of crash detection services that are run by the private sector and emergency response services run by the public sector. These linkages can help initiate faster, more appropriate dispatching of response teams. During incident clean-ups, ITS can also provide real-time information to the traffic management centre, and help to route traffic around the affected area.

ITS is also a part of Ontario's high-tech industry success story. Ontario industries have already developed and delivered a broad range of ITS applications world-wide, with more planned for the future. The federal government estimates the annual world market for ITS at $90 billion by 2011. Over the same time frame, the projected share of the global market for Canadian industry is $6.7 billion.

## HOW ITS HELPS ONTARIO

Over the past 25 years, Ontario's transportation system has taken advantage of – and also helped to pioneer – a number of successful ITS applications. In fact, Ontario was key to the development of the ITS industry. The first computerized traffic signal control system in North America was installed in 1963 by the City of Toronto, and Ontario's deployment of ITS has continued from there. Some of Ontario's more notable applications are described below.

### *COMPASS*

One of the most visible ITS applications in Ontario – and one that is familiar to millions of motorists – is the province's COMPASS freeway traffic management system. COMPASS is a centrally operated network used by MTO to increase safety and improve flow on major provincial highways.

With COMPASS, daily commuters can travel faster to and from work with fewer incidents, and commercial operators are able to move goods into, out of and across the Toronto region more efficiently.

COMPASS Toronto Traffic Operations Centre

Approximately 30 per cent of the congestion on Toronto highways is caused by traffic incidents, and COMPASS' most important role is to detect and help manage these incidents. Using traffic monitors in the highway and complex computer algorithms, COMPASS can automatically detect incidents quickly after they occur. System operators can

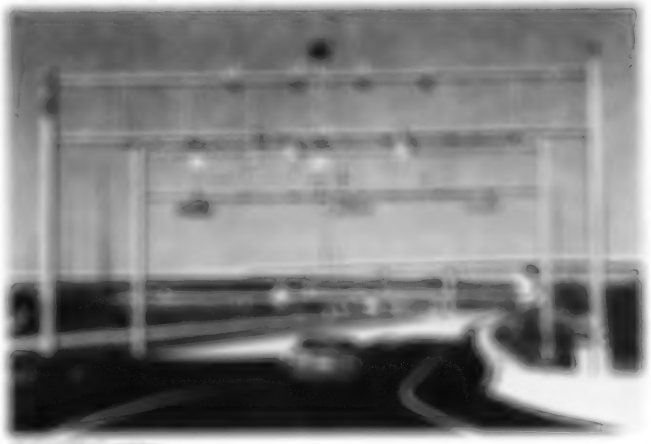
confirm and assess the incidents by using COMPASS closed-circuit cameras and begin working to manage the response – for example, by helping emergency vehicles get to the scene of an accident sooner, and then helping to re-route traffic so that the incident can be cleared quickly and effectively.

By providing real-time information to drivers – through overhead message signs, a Web site, media advisories and camera/video images – COMPASS helps MTO to manage traffic more effectively by balancing vehicle flow between the express and collector lanes on Highway 401.

The COMPASS system is currently installed on Highway 401 and other 400-series highways in the Greater Toronto Area, on sections of the Queen Elizabeth Way (QEW), and on Highway 417 in Ottawa. The system recently celebrated its 25th anniversary, and has demonstrated its ability to reduce traffic congestion and increase transportation efficiency.

### *Highway 407 ETR*

One of Ontario's undoubted success stories is Highway 407 ETR – the first fully electronic toll highway in the world. Highway 407 ETR was built through an innovative public-private partnership in the mid-1990s and continues to be enhanced and expanded today. The highway's fully electronic tolling system supported a business model that allowed the partnership to build Highway 407 ETR many years sooner than would have been possible using a traditional approach to construction, with significant cost savings for provincial taxpayers.



407 ETR tolling

Highway 407 ETR uses a central information processing system still in vehicle electronic transponders and video licence plate recognition to record trips and automatically charge tolls to customers. The highway's ITS technology completely eliminates the toll plazas and lanes associated with traditional toll highways, saving time for hundreds of thousands of commuters daily.

### *Winter Maintenance Applications*

Winter travelers may not be aware of ITS applications are helping to make their trips safer, while also reducing the environmental impact of winter maintenance activities. MTO and a number of municipalities in Ontario currently use ITS to improve winter maintenance in a number of ways.

Advanced Road Weather Information System (ARWIS) provides timely information about road conditions that is used to keep the highways and roadways operating safely in winter. The system uses in-ground sensors, weather sensors and communications technology to assess local road and weather conditions. This information is collected and integrated with information from other sources and sources to provide real-time pictures of winter maintenance needs. Road maintenance crews use the information to help determine the need for salting, sanding, plowing, and other winter maintenance activities.

Highway Maintenance

(Intelligent Vehicle Initiative) (IVI) system. The existing system includes the following: (1) Automatic Vehicle Location (AVL) system, (2) Automatic Vehicle Identification (AVI) system, (3) Automatic Vehicle Classification (AVC) system, (4) Automatic Vehicle Monitoring (AVM) system, (5) Automatic Vehicle Control (AVC) system, (6) Automatic Vehicle Navigation (AVN) system, (7) Automatic Vehicle Communication (AVC) system, (8) Automatic Vehicle Information (AVI) system, (9) Automatic Vehicle Maintenance (AVM) system, (10) Automatic Vehicle Management (AVM) system, (11) Automatic Vehicle Operation (AVO) system, (12) Automatic Vehicle Safety (AVS) system, (13) Automatic Vehicle Security (AVS) system, (14) Automatic Vehicle Environment (AVE) system, (15) Automatic Vehicle Energy (AVE) system, (16) Automatic Vehicle Emergency (AVE) system, (17) Automatic Vehicle Entertainment (AVE) system, (18) Automatic Vehicle Communication (AVC) system, (19) Automatic Vehicle Information (AVI) system, (20) Automatic Vehicle Maintenance (AVM) system, (21) Automatic Vehicle Management (AVM) system, (22) Automatic Vehicle Operation (AVO) system, (23) Automatic Vehicle Safety (AVS) system, (24) Automatic Vehicle Security (AVS) system, (25) Automatic Vehicle Environment (AVE) system, (26) Automatic Vehicle Energy (AVE) system, (27) Automatic Vehicle Emergency (AVE) system, (28) Automatic Vehicle Entertainment (AVE) system, (29) Automatic Vehicle Communication (AVC) system, (30) Automatic Vehicle Information (AVI) system, (31) Automatic Vehicle Maintenance (AVM) system, (32) Automatic Vehicle Management (AVM) system, (33) Automatic Vehicle Operation (AVO) system, (34) Automatic Vehicle Safety (AVS) system, (35) Automatic Vehicle Security (AVS) system, (36) Automatic Vehicle Environment (AVE) system, (37) Automatic Vehicle Energy (AVE) system, (38) Automatic Vehicle Emergency (AVE) system, (39) Automatic Vehicle Entertainment (AVE) system, (40) Automatic Vehicle Communication (AVC) system, (41) Automatic Vehicle Information (AVI) system, (42) Automatic Vehicle Maintenance (AVM) system, (43) Automatic Vehicle Management (AVM) system, (44) Automatic Vehicle Operation (AVO) system, (45) Automatic Vehicle Safety (AVS) system, (46) Automatic Vehicle Security (AVS) system, (47) Automatic Vehicle Environment (AVE) system, (48) Automatic Vehicle Energy (AVE) system, (49) Automatic Vehicle Emergency (AVE) system, (50) Automatic Vehicle Entertainment (AVE) system.

### Traffic Management in Toronto

Advanced Traffic Management System (ATMS) in Toronto, Canada. The ATMS is a comprehensive traffic management system that integrates various components, including traffic signals, detectors, cameras, and communication networks, to monitor and control traffic flow in real-time. The system aims to improve traffic efficiency, reduce congestion, and enhance safety for all road users.

Toronto ATMS Traffic Management System

### Automated Road Analyzer (ARA-IV)

Automated Road Analyzer

### Transit Applications

Advanced Fare Management Technology for Transit

### Other ITS Applications in Ontario

### Resources ITS Industry

industry has been on traffic management for arterial roadways and incident and congestion management for major highways.

Ontario's universities have also recognized that ITS plays an important role in transportation, and a number of institutions are developing ITS-related curriculum and facilities. Perhaps the most notable of these facilities is the ITS Test Bed at the University of Toronto. This learning centre gives students an electronic facility that can monitor traffic in Toronto, allowing them to assess various management scenarios against real-time conditions. The Province of Ontario, through the Ontario R&D Challenge Fund and the Ontario Innovation Trust, has invested more than $400,000 in the ITS Test Bed, as one method to contribute to Ontario's future prosperity by providing new tools for the efficient transportation of people and goods.

## MARKET FACTORS SHAPING THE ITS STRATEGY

The ITS market – both in Ontario and worldwide – is changing and evolving very rapidly. And to a large extent, developments in Intelligent Transportation Systems parallel developments in the computer and communications industries. ITS development is also related to the availability of both wired and wireless communications infrastructure, such as fibre optic cables, cellular and satellites.

As noted earlier, the worldwide ITS market is estimated at more than $40 billion by 2003. However, the creation of viable markets for ITS products and services depends on several factors, including:

- broad agreement on a shared vision for the role of ITS in the future throughout Canada and across North America;
- the level of maturity of the technology involved;
- the ability of users to understand the technology and their willingness to pay for ITS services;
- the relative economic and governance models in Ontario, Canada and the U.S.;
- the willingness of the private sector to invest in ITS projects; and
- the ability of the ITS industry to resolve issues about security of information and the protection of personal privacy.

### *Broad Acceptance of a Shared Vision*

The concept of Intelligent Transportation Systems depends on the integration of equipment, services and systems. It is therefore critical that individual components and whole systems be compatible – both with those that have been built in the past, and those that will come in the future. As a result, each organization involved in ITS must have a broad understanding of its role in the delivery of a "whole" (i.e., compatible and integrated) system.

In this regard, the international air traffic control system furnishes some useful parallels. Over the years, the aviation industry has established a detailed series of technical and operational protocols and procedures that are now accepted and used around the world. One of these systems – which allows integrated flight control throughout the world – lets air traffic controllers in one jurisdiction "hand off" flights to controllers in neighbouring jurisdictions smoothly, seamlessly and safely. To achieve this system, air traffic control personnel – from Australia to Zaire – all use compatible equipment, systems and standards, as well as a common language.

Similarly, the successful deployment of ITS applications in North America depends on all jurisdictions reaching a shared vision of the purpose of ITS, and on the adoption of common standards for the many potential ITS applications.

Through ITS America, the U.S. Department of Transportation recently produced a report entitled, *National Intelligent Transportation Systems Program Plan: A Ten-Year Vision*. The report enunciates a detailed vision of ITS – a vision that Ontario must both understand and embrace, since ITS applications throughout the province will need to be compatible with those in the U.S.

This Strategic Transportation Directions document begins the process of developing a shared vision for the future within Ontario, and is intended to provide a basis for ongoing discussions and planning. It begins with the premise that Ontario's vision for ITS must encompass several strategically important areas, including:

- *Agreement on goals and associated performance measures.* In the future, for example, the traditional goals for ITS in congestion management in cities and at border crossings may be replaced by the goal of establishing and maintaining predictable travel times through a region or gateway.

- Agreement on the ITS services that are of interest to various parties, and the role of each party in delivering these services.
- Development of effective partnerships. Partnerships will be critical – both between public sector agencies and between public and private sector organizations – along with mechanisms for more flexible and timely decision-making.

One of the keys to creating a shared vision, as well as to understanding its implications, is the adoption of a common definition, structure and relationship of the components of ITS – parameters that are known as the *ITS Architecture for Canada*. However, Ontario's proximity to the United States and the economic reality of our cross-border movement of people and goods are also driving the need to ensure the adoption of a common North American vision, architecture and standards. Work is currently under way on this, and will need continued provincial support. At the same time, a number of other Canadian jurisdictions, including the Atlantic provinces Manitoba and British Columbia, are currently developing ITS strategic plans of their own.

## *Technological Maturity*

ITS applications are currently being used to meet a range of transportation needs. In general, specific ITS applications rely on specific technologies. As these applications are deployed over time the technology changes modifying our deployment. In the future, ITS opportunities are likely to expand as the technologies they depend on continue to develop and mature.

One example of a mature ITS technology is inductive loop detectors that are embedded in pavement to monitor traffic. These sensors are used extensively for traffic management in Ontario today. However, the technology has some major limitations that prevent its use in monitoring traffic conditions on every road across the province.

New types of sensor systems are now emerging that rely on different technologies – either using roadside equipment (such as video monitoring cameras and microwave radar) or in-vehicle equipment (such as transponders and cell phones). At present, however, the newer systems cannot provide the same level of information as the inductive-magnetic loop sensor. Moreover, making the transition to a newer technology will require changes to the performance measures and algorithms currently used for traffic management.

### Maturity of ITS Technologies

- **Incident confirmation systems** – the fact that there are no immediate alternatives to closed circuit television cameras will limit geographic deployment in the future.
- **Driver information systems** – existing systems are immature, but hold promise of major benefits to travellers and road authorities.
- **Road Condition and Weather Forecasting Systems** – monitoring technologies are maturing quickly, but forecasting systems are still in their infancy.
- **Emissions Sensing Systems** – existing systems immature, and not cost-effective for widespread mobile deployment.
- **Vehicle Location Systems** – a rapidly maturing field.
- **Electronic Payment Systems** – for isolated applications, mature systems exist; however, development of multiple uses of the same equipment still needs support.
- **On-board Safety Monitoring Systems** – various levels of technological maturity, with no systems that are fully deployable. This area has tremendous safety potential.
- **Virtual Warehousing Technology** – information storage and retrieval technology is mature, although deployment in smaller communities and remote areas of the province will require more effort. Institutional issues will also need to be addressed.
- **Vehicle-Based Sensors** – aside from sensor-based warning systems that alert drivers to objects when backing up, vehicle-based sensor technologies are not generally mature enough for operational deployment.
- **Automated Vehicle Systems** – Some aspects of automated vehicle technology are gradually becoming deployable, but the field as a whole remains immature.
- **Geographic Location Referencing** – GPS technology is mature, but its application to cell phones and vehicles continues to evolve.
- **Communications Infrastructure** – Coverage of Ontario by the wireless communications network continues to evolve. High-bandwidth telecommunications capacity is currently only available to high-volume users in large urban centres and along key corridors.

Although some challenges remain, the newer sensor and communication technologies hold the promise of providing broader geographic coverage at lower cost. It would therefore be beneficial to pursue the early deployment of these new technologies in selected areas, to allow testing and development of the required algorithms, and to begin filling in geographic gaps in monitoring.

### *User Understanding and Willingness to Pay*

ITS has been deployed for a number of years to provide specific services, such as traffic management, but most applications have not required the traveling public either to understand the technology involved, or to pay for it. By contrast, many of the newer ITS applications, as well as service improvements to existing applications, will require end-users to have more knowledge about the systems they are using and how they work, as well as what they cost.

Today, most travelers remain unaware of high-technology's potential for enhancing transportation. Moreover, the experience in the U.S. has indicated that travelers may not be willing to pay for high-tech services, such as real-time traveler information, unless they are convinced that the services will bring them significant benefits.

By contrast, those who support further rapid deployment of ITS products and services believe that their benefits will become more obvious with increased use. In some circumstances, such as telematics, this is a virtual "Catch 22" situation – in which the ultimate decision may be between building an ITS system purely on faith, and risking significant amounts of capital in the process, to help develop an enthusiastic market that will then purchase the available services.

Addressing the market uncertainty and risk associated with ITS must be approached cooperatively by both the public and private sectors, with the private sector taking the lead in marketing efforts. For example, General Motors recently produced a "Batman" series of TV advertisements for its OnStar service – which provides traveller information and emergency assistance. This is a good example of how mass media can be used to help the public understand more about the potential of ITS.

Government efforts in ITS should include attempts to minimize some of the risks inherent in product development. For example, one major aspect of the private sector's ITS services in the future will involve traveller information services. In this case, government could make transportation data available at little or no cost early in the industry's development. Access to information across multiple government levels and agencies in a defined region or transportation corridor would also need to be streamlined and coordinated, to reduce the number and complexity of negotiations that the developing traveler information services industry would face.

Finally, both government and industry need to work cooperatively to understand and respond to human factor implications of the new technology and services, such as driver distraction. Ultimately, it is in the public interest to have advanced ITS systems deployed, and to ensure that those services enhance the driving experience, rather than create potentially unsafe situations.

### *ITS and Economic/Governance Models*

The differences between Canadian and U.S. approaches to ITS – and particularly in terms of the two countries' models of economics and governance – will have an impact on Ontario's deployment of ITS, as well as its potential to become a world leader in the field.

Compared to Canada, the relative population and economic size of the U.S. naturally positions it as the primary North American market for private sector investment in ITS. Investments in ITS that are made in the U.S. will thus likely transform its ITS sector into a world leader in many applications.

That being said, however, industries in Ontario and Canada have already demonstrated considerable capabilities in the world market. In the future, continued efforts that focus on the development of specific ITS products and services can provide Ontario companies with opportunities for further expansion, as well as worldwide recognition of our expertise. Those products and services could include:

- transit integration and incident management in the GTA/Golden Horseshoe region;
- the development of new transportation data collection technologies along key economic corridors; and
- MAYDAY-style emergency detection and response systems across Ontario.

In the U.S., the federal government has wholeheartedly accepted the concept and the potential importance of ITS. Through its top-down governance model, Washington is actively pushing the development and deployment of ITS applications across the

country by all levels of government. Canada, by contrast, has not adopted the same kind of centralist governance model for ITS. As a result, there is no comparable policy direction and support for ITS coming from the national government. The Canadian approach requires decisions on policy direction for ITS to be reached in a more consultative and cooperative manner.

The result of the Canadian approach to ITS has been a significant lag in key decision-making and financial commitments. The delay affects all parties with an interest in ITS development, both in the public and private sectors, and the resulting environment of uncertainty limits Ontario's potential to become a world leader in the field.

To address this situation, Ontario must begin with a clear definition of its goals and priorities for ITS, and adopt a strategic approach to achieving them through deployment. The same clarity – in terms of Ontario's ITS goals, objectives and priorities – must then be conveyed to other government agencies and the private sector. This *Strategic Transportation Directions: Intelligent Transportation Systems* document represents a first step towards achieving the clarity that is needed for the implementation of effective measures in the future.

### *Promoting Private Sector Investment*

Since deployment of ITS is a responsibility that must be shared by government and industry, it will be mutually beneficial and necessary for both sectors to support each other's investment needs and interests in ITS, to ensure that ITS-related infrastructure and services work together.

It is anticipated, for example, that in-vehicle technology will be developed and deployed mainly by the private sector. Yet this technology will also offer many opportunities to re-examine and re-engineer the delivery of public sector services, such as traffic management. Clearly, the future development of both areas – in-vehicle technology and traffic management services operated by the public sector – is very much related, and offers a number of potential synergies.

It therefore follows that such development needs to proceed cooperatively in the future. Reengineering of traffic management systems and processes, for example, can help provide the information necessary to make new in-vehicle applications, such as route guidance, more effective. And more effective technologies, to the extent that the public finds them effective and desirable, will be more easily marketable by the private sector.

To support this relationship, the public and private sectors can undertake a number of activities, such as:

- accelerating the deployment of traffic sensor systems in selected areas and working with industry on alternative traffic information collection technologies, to provide a more comprehensive data stream;
- providing easier access to transportation data from multiple agencies within a geographic area, and adopting the use of standard licence agreements with users of the data;
- providing start-up businesses with guaranteed low rates for data access;
- assisting in the marketing of ITS products and services to potential users;
- working jointly on ITS architecture and standards development; and
- understanding each other's needs regarding safety and regulatory flexibility.

### *Security and Protection of Privacy*

One of the major underpinnings of ITS is the need to share relevant information among organizations, and this raises issues of the security of the information and the protection of individual privacy. In Canada, federal legislation has clearly defined limits on the ability of organizations to share information without first obtaining the express consent of their customers. Provincial legislation is currently being prepared to address the same issue.

What is clear, however, is that the need to secure information from unauthorized use and access will become a fundamental principle of ITS system design in the future. Accordingly, this issue needs to be considered now to ensure that the appropriate principles and safeguards are built into our collective plans.

## ONTARIO'S VISION

Ontario's transportation vision is to have the appropriate facilities and services in place to meet the demands of its people and economy, both today, and throughout the 21st century. Intelligent Transportation Systems represent a key component of the government's overall transportation objective of improving the efficiency of the existing system.

A fundamental principle of the government's strategy is that Ontario will need a more efficient and effective transportation system that can continue to support economic investment and the creation of new jobs. In this regard, the province needs to work toward building a comprehensive transportation system that links all the different travel modes together into a seamless, effective whole.

ITS is a critical tool in transforming the province's surface transportation network into an effectively managed, well-integrated, universally accessible and affordable system. ITS has an important role to play in ensuring that the provincial transportation system provides for the safe, secure, efficient and economical movement of people and goods, while enhancing overall customer satisfaction and remaining environmentally sustainable.

To ensure the balance needed in the provincial transportation system, Ontario must work to integrate the various ITS applications that are in use today, while seeking to integrate the new ITS applications that are certain to be developed in the future.

### ONTARIO'S ITS-BASED TRANSPORTATION VISION

Daily commuters will enjoy safe, predictable and efficient trips with:

- a minimum of well managed effects from congestion, construction and maintenance;
- easy access to anticipated and actual road, weather, traffic and parking conditions before and during commutes; and
- access to efficient, seamless park and ride operations.

Commercial vehicles will travel safely/predictably along key corridors, with:

- fewer, more efficient and accurate stops required for safety/security/customs inspections;
- a minimum of well managed impacts from congestion, construction and maintenance; and
- easy access to anticipated and actual road, weather and traffic conditions before and during trips.

Public transit will assume a larger share of the daily commuting traffic, by:

- providing riders with seamless crossings of jurisdictional boundaries;
- providing commuters with efficient, seamless park/ride operations; and
- allowing travelers to optimize transit use and routes more easily.

Travelers will be safer and more secure, thanks to:

- systems that automatically detect travel emergencies and then initiate an appropriate response; and
- information systems that advise drivers on travel and traffic conditions, as well as severe weather and road conditions.

Transportation-related services operated by the public sector will be progressively more efficient, due to:

- better distribution of service delivery across public and private sectors;
- more efficient management and maintenance of transit, emergency and road maintenance vehicle fleets;
- better targeting of vehicle safety and security enforcement activities at potential offenders; and
- better co-ordination and integration of transportation related services delivered in common geographic areas through the creation of virtual and physical regional operations centres.

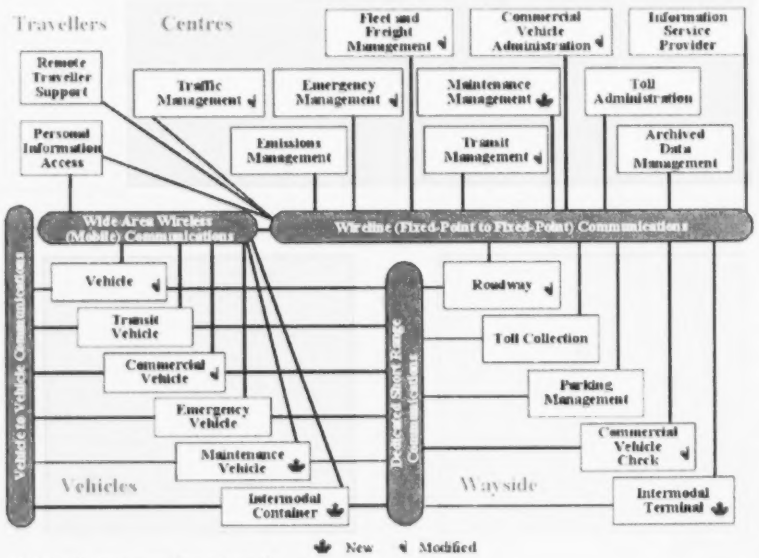
## AN ITS MODEL FOR ONTARIO

As with most jurisdictions around the world, Ontario's current ITS environment is fragmented. One of the main reasons for this is that ITS technologies, products and services have traditionally been pursued in isolation.

In the Government of Ontario's view, the next phase of ITS development should focus on integrating the various ITS technologies, products and services that are currently available. The move toward integration will help facilitate the creation of a viable market for ITS in Ontario, while allowing the province to take the fullest possible advantage of the significant multi-modal benefits that Intelligent Transportation Systems have to offer.

To achieve better integration of ITS products and services, the province envisions a new model for ITS deployment that responds to, and takes advantage of, technological capabilities and private-sector investments, both of which change over time. Implementing the new model involves four key activities:

- bringing ITS into the mainstream of transportation planning and development;
- taking a planned and structured approach to ITS deployment;
- encouraging private sector development and pursuing partnership opportunities; and
- establishing realistic performance goals and measures for ITS.



ITS Architecture for Canada

### *Bringing ITS into the mainstream of transportation planning and development*

For many years, Intelligent Transportation Systems have been seen as a set of potentials – in effect, a research and development dream – rather than a set of achievements. And it is likely that some potential ITS products and services will remain firmly in the realm of the possible, rather than the probable, at least for some time.

More importantly, while the potential and indeed the demonstrated achievements of ITS are generally recognized by the transportation planning community, Intelligent Transportation Systems planning remains a fringe activity. The fact is, despite the successful deployment of a number of sophisticated systems throughout the world, ITS still does not actively figure into most jurisdictions' long-term planning activities, and is not routinely deployed in their transportation processes.

This environment needs to change. To achieve their full potential, ITS products and services must become integrated components in the transportation development process. And in order for that to happen, ITS must be viewed as a necessary, fully integrated component of effective transportation planning.

MTO is taking a significant step to integrate ITS into the transportation planning process by including this proposed provincial ITS strategy as part of its *Strategic Transportation Directions* reports. By including ITS in a province-wide discussion of Ontario's transportation future, the government's goal is to build the benefits of ITS into the transportation system that will serve Ontario throughout the 21st century.

### *Taking a planned and structured approach to ITS deployment*

For many years, the ITS field has produced a number of isolated technologies and systems – yielding products and services that have been independently developed and deployed, most of which operate without interconnections or linkages. In the

past, the development of these systems was limited both by the capabilities of existing technology and the institutional approaches taken to bring them on stream.

Technological capabilities in the broad electronics, telecommunications and computing world have grown tremendously and show no sign of slowing down in the future. As a result, technology is no longer a limiting factor to the integration of ITS applications. In fact, technology has become a fundamental enabler of institutional reengineering.

The *ITS Architecture for Canada* provides a strong starting point for a new approach to deploying ITS. The main benefit of the architecture is that it provides an ITS template that can help different jurisdictions determine relatively quickly whether and how each ITS service area is relevant to its specific needs, who they should be working with, and the best way to prepare a comprehensive regional plan.

The Canadian ITS architecture also helps in a much broader way – by defining the interactions of the various ITS components. These cross-component definitions make it much easier to identify areas and applications where common standards are needed, and thus to facilitate integration and interoperability.

### *Encouraging private sector investments and exploring partnership opportunities*

Currently, the private sector is leading the way in ITS investment, and not surprisingly, such investments generally occur in applications which offer opportunities for profit. These areas include in-vehicle technology, telecommunications infrastructure, infotainment devices, informa.ion services and commercial vehicle safety.

While private-sector investments are currently driving the realignment of traditional roles in ITS, and moving the industry as a whole toward embracing the new, integrated approach to ITS deployment, the public sector will continue to have an important role in ITS development. Specifically, public-sector agencies need to work to further encourage the realignment of roles by highlighting ITS-related business and partnership opportunities to the private sector, and by mitigating risk in those areas that are perceived to have the greatest potential benefits to the public.

There are many examples of such potential opportunities:

- Expanding wired and wireless telecommunications infrastructure will facilitate several aspects of Ontario's vision of ITS. Building an adequate telecommunications capability will also:
  - support the sharing of information that is critical to the establishment of virtual data warehouses;
  - support the separation of data collection, processing and dissemination components of ITS applications; and
  - improve the dissemination of information to travelers.
- Commercial fleet management systems can be adapted to support transit, maintenance and emergency vehicle fleet management and dispatch applications.
- The development of electronic devices that incorporate both communications and multimedia functions creates opportunities for the provision of traveller information – virtually anywhere, anytime and in any desired format.
- The increasing number of information service providers doing business in Ontario ensures that the value-added information packaging industry is here to stay. Such companies will need to be able to access, manipulate and repackage transportation data to provide marketable information that can be tailored to the needs of individual travelers. The addition of transportation engineering to a solid base of customers for traveler information would likely give private service providers other business opportunities, perhaps including the development and operation of a profit-oriented virtual transportation data warehouse.
- The carrier industry's investment in logistics to support the just-in-time delivery of goods also positions them well for supporting or financing the deployment of ITS systems for safety, security and more efficient customs inspections and clearance.
- The adoption of innovative financing arrangements in many private-sector ventures allows companies with experience in this area to extend the innovations to other areas, including taking on responsibility for the delivery of services on behalf of the government. Examples of activity areas includes data warehousing, traveler information and non-core traffic management services.

### *Establishing realistic performance goals and measures for ITS*

As Ontario's economy and population continue to grow, the demand for transportation – and with it, traffic congestion – will also grow, particularly on routes in and between major urban centres, and on economic corridors to the U.S.

Traditionally, the performance measures used for transportation focus on reducing travel time to the minimum – in order to get people and goods from Point A to Point B as quickly as possible. However, in some parts of Ontario – and particularly through the GTA/Golden Horseshoe region – it may no longer be practical to talk in terms of minimum and maximum travel times. The increasing number of vehicles, the growth of the economy and population, the fact that there is no room left on some routes for expansion – all these factors mitigate against the continued use of traditional performance measures.

Today – and increasingly in the future – a more appropriate approach to setting performance goals and measures will be to focus on keeping travel times predictable, and within those predicted times, to keep them as consistent as possible. ITS can help increase both the predictability and consistency of travel times by improving incident management, providing support for maintenance teams and transit improvements, providing information to travelers and pre-clearance to commercial vehicles.

Automated Collision Detection

## A REGIONAL ITS FOCUS

This section of the report outlines the critical ITS services needed in the four provincial regions identified in MTO's *Strategic Transportation Directions* documents – Northern, Southwestern, Eastern and Central Ontario. The regional discussion focuses on ITS services that are deliverable within the short- to medium-term timeframe – which is defined as between one and 10 years.

### *Northern Ontario*

Most of Northern Ontario's major highways do not face the congestion that exists in the largest urban centres of Central Ontario. However, northern highways involve issues associated with traveling long distances, accessing remote areas, ensuring access to markets, coping with severe weather conditions, and dealing with limited modal choices and access points.

Intelligent Transportation Systems can assist travelers in Northern Ontario in several ways. For example, ITS can make travel safer and more predictable by giving all travelers in the North easy access to road and weather forecasts and real-time conditions, including information on highway construction projects and planned lane closures. This type of traveler information service will be critical for commercial operators along key economic corridors in the North, including Highways 11, 17 and 69.

ITS can provide commercial operators with access to information on road, weather and congestion conditions in Southwestern and Central Ontario, as well as at major U.S. border crossings. This information will help commercial carriers select the best routes over which to move their goods to market.

ITS can enhance road user safety for all travelers in Northern Ontario through an expansion of automated collision detection and notification services throughout the region. Expanding the links between private operators and public emergency response teams has the potential to reduce the severity of injuries resulting from road incidents, while improving overall safety for all travelers.

ITS can also enhance safety for all residents of Northern Ontario by providing electronic tracking of hazardous and dangerous goods, and integrating this information with transportation planning and incident response systems.

### *Southwestern Ontario*

Southwestern Ontario highways include several major trade corridors between Canada and the U.S. – including Highway 401, which is arguably the most important highway in Canada, and Highway 402. On such routes, and at major border crossings, ITS systems can be used to offer electronic clearance and/or pre-clearance to eligible commercial vehicles.

Integrated Electronic Pre-Clearance

As well, on approach routes to major border crossings, traffic management systems can also be deployed and integrated with local and regional traffic management systems, to improve the speed and efficiency of cross-border trade and travel. For commercial carriers and ordinary travelers alike, ITS can make cross-border travel both safer and more efficient and convenient.

Travelers on major routes in Southwestern Ontario would also benefit significantly from traveller information systems that monitor and predict road and weather conditions, and provide information on major road construction projects, lane closures, congestion and incidents.

To ensure that as many drivers as possible have access to the information these systems provide, the information should be produced in multiple formats. Moreover, any additional traffic monitoring services available in major tourism centres and on routes serving major tourist destinations, such as Wasaga Beach, Niagara Falls/Niagara-on-the-Lake and the GTA, should be compatible with and linked to the traveller information services available in Southwestern Ontario.

Over the next 10 years, drivers on major routes throughout Southwestern Ontario will also benefit from the increasing deployment of automated collision notification systems. Over time, these systems will need to be integrated with emergency response services in rural and urban areas, and along key economic corridors.

In Southwestern Ontario – and indeed throughout the rest of the province – all travelers will benefit from the deployment of ITS systems that provide electronic tracking of all hazardous and/or dangerous goods movements. At a minimum, such deployment will need to cover major border crossings and key economic corridors, and be integrated with transportation planning and incident response systems.

### *Eastern Ontario*

Eastern Ontario's highways include Ontario's major economic corridor – Highway 401 – and a number of other important routes, including Highways 416 and 417 in the National Capital area. Eastern Ontario also includes many smaller highways, as well as Highway 7, which is an important east-west route between the GTA and Ottawa.

Commercial carriers on major routes in Eastern Ontario – as well as at major border crossings in Cornwall and near Gananoque – can benefit significantly from ITS systems that offer electronic clearance and pre-clearance to eligible vehicles. However, Ontario will need to ensure that any ITS systems deployed to manage commercial vehicles are integrated with local and regional traffic management systems, particularly in the Ottawa area.

Within the next decade, all highway users in the Ottawa area could realize significant potential benefits from a pilot project to create a regional operations centre for transportation. Such a facility would integrate the operations of local transit companies, highway and municipal road maintenance teams, emergency response services, parking and traffic management.

On major routes in Eastern Ontario, all road users would benefit from the deployment of traveler information systems to monitor and predict road conditions. The ITS systems deployed would need to provide information on road and weather conditions, highway and/or lane closures due to construction, congestion, incidents, and so on – and to do so in multiple formats, in order to reach as many travelers as possible.

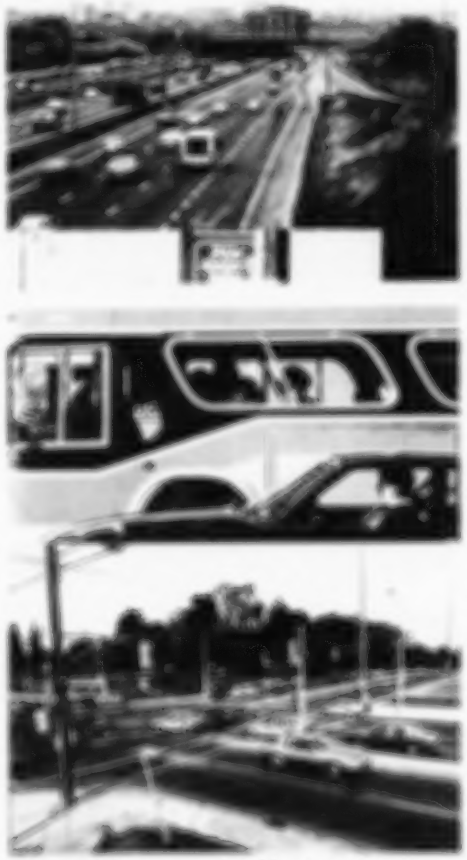
Moreover, any additional traffic monitoring services available in major tourism centres, such as Ottawa Hull, on routes serving major tourist destinations, such as Upper Canada Village, and on routes serving major border crossings, should also feed into any provincial traveller information services deployed in Eastern Ontario.

Over the next 10 years, travelers on major Eastern Ontario routes will likely benefit from the increasing deployment of automated collision notification systems. Such systems will need to be integrated with emergency response services – both in rural and urban areas, and along Highways 401, 416 and 417.

Eastern Ontario travelers would also benefit from the deployment of ITS systems that provide electronic tracking of all hazardous and/or dangerous goods movements. These systems should be deployed to cover border crossings and key economic corridors, and will also need to be integrated with transportation planning and incident response systems.

### *Central Ontario*

Central Ontario's transportation network is both highly complex and heavily used, and transportation demand in the region is expected to grow significantly over the next 20 to 30 years, along with the population and economy. Growth is expected to bring significant challenges for transportation facilities throughout the region – with more traffic, more congestion and more pressure to expand the system.



Regional Transportation Management

Central Ontario travelers and the whole region's transportation network can benefit significantly from the strategic deployment of Intelligent Transportation Systems. ITS applications can play a major role in helping travelers and transportation managers throughout Central Ontario adjust to the pressures of growth by improving the safety and operational efficiency of major roadways, and by reducing both traffic congestion and related environmental pollution.

In Central Ontario – which is often described as the economic engine of Ontario and Canada – all road users will see a steady increase in commercial vehicle traffic over the next quarter-century. This growth will be fuelled by several factors, including a net increase in north-south trade, and business trends such as the need to maintain low inventories and just-in-time delivery.

With more and more trucks on our roads in the future, and more businesses and jobs depending on the efficiency of Ontario's road network, the province can use ITS systems to mitigate some of the negative consequences of growth – for example by providing electronic clearance for eligible commercial vehicles.

Deploying commercial vehicle pre-clearance systems on major trade corridors and at key international gateways would enable Ontario to support U.S. measures to enhance homeland security. At the same time, these ITS systems would help to offset any of the potentially negative impacts these security measures might have on the efficient movement of people and goods.

In the Greater Toronto/Golden Horseshoe region, traffic congestion is currently an increasing concern, and represents a significant impediment to doing business. As a result, motorists over the next few decades will come increasingly to rely on expanded traffic management systems to guide them in the efficient use of the region's major routes. As these provincial facilities are expanded, MTO will also need to

work on integrating them with local and regional traffic management systems in the Greater Toronto and Hamilton areas, to ensure consistency of information and seamless operations.

From the traveler's point of view, the traffic management facilities that serve Central Ontario – regardless of whether they are provincial or regional facilities – must ultimately be both compatible and interoperable. At the same time, traffic management services must be integrated with traveler information systems that provide coverage for the same area.

In time, motorists traveling on southern Ontario's busiest highway corridors would realize a number of tangible benefits from a mature traveler information system. These benefits would include:

- forecasts and real-time advice on road and weather conditions in key corridors;
- direct (and even inter-active) access to information on specific tourist destinations and related facilities;
- advance warning of traffic conditions through major urban centres and at border crossings, including anticipated delays; and
- route guidance to major destinations, along with concierge-type services.

In Central Ontario integrating the wide range of beneficial ITS products and services for the greatest possible number of users poses not only the greatest challenge, but also the greatest potential benefits. From the user's point of view, existing and future ITS applications must be seamless and well integrated. Achieving that kind of seamless integration will require technological and operational compatibility and a much greater level of co-operative planning and deployment than has been the case in the past.

For example, current technology offers at least the potential to successfully integrate local, regional and provincial traffic management systems. And there is no doubt that such integration would bring significant benefits for all road users.

Ultimately, however, Ontario must begin looking to broaden its approach to integration, and work toward a system in which the various transportation agencies, jurisdictions, modes and activities – from traveler information to road maintenance to emergency response services – operate as a coordinated and seamless whole.
One area in which better coordination and integration are vital to public transit.

Millions of passengers rely every day on public transit, without whose services Central Ontario's transportation system would likely grind to a halt. Currently there are dozens of active transit operators in Central Ontario. Each operator owns and maintains its own vehicles, and has its own routes, fares, and schedules. And unfortunately – at least from the traveler's point of view – transit operators currently do very little to coordinate or integrate their services.

Effective mass transit is vital to the economic and social future of the GTA and Golden Horseshoe region – and to the quality of life of the millions who live there. As a result, there is an urgent need for transit operators throughout the GTA and Hamilton areas to explore ways of achieving better coordination and integration – both in their operations and their payment systems. Successful integration is the key to transit operators being able to retain their existing customers and attracting new riders. Moreover, attracting more people to public transit is vital to the continued financial viability of the transit companies, and to addressing the increasing gridlock that Central Ontario is likely to face.

On behalf of all travelers in Central Ontario, provincial, local and regional transportation authorities need to begin working more closely together – and to begin developing the concept of regional transportation operations centres for the Greater Toronto and Hamilton areas. The purpose of these centres would be to integrate the operation of local, regional and provincial traffic management systems, along with public transit, highway maintenance, emergency response services and parking management.

Over the next 10 years or more, highway users in Central Ontario will also benefit from the deployment of ITS technology that automatically notifies highway managers of collisions, and integrates that information with emergency services response teams in all urban and rural areas of the region.

Finally, traveler and environmental safety in Central Ontario will be significantly enhanced by the deployment of ITS systems that provide electronic tracking of all hazardous and/or dangerous goods movements. The deployment of these systems should provide coverage at border crossings and throughout key economic corridors. Moreover, the systems should be integrated with transportation planning and incident response services.

## ONTARIO STRATEGIES FOR ITS

MTO has developed five strategies to implement its vision for ITS, in order to support the transportation needs of people and businesses in Ontario. Along with each strategy, the ministry has developed an associated set of actions – actions designed to implement the strategy. Both the proposed strategies and actions reflect the ITS products and services that were identified earlier in this document – products and services that will benefit travelers throughout Ontario's different regions.

**Safe, predictable travel on Ontario's key transportation corridors will enhance personal mobility and our overall quality of life.**

*Strategies*

- Adopt a multi-tiered approach to "smart" highways province-wide, by:
  - building all new provincial highways as "smart" roads that incorporate infrastructure for traffic, road and weather condition monitoring and management;
  - upgrading existing highways by incorporating the desired level of intelligent transportation systems infrastructure; and
  - rehabilitating existing "smart" highways that are nearing the end of their useful lives to meet current ITS standards.
- Work with the Ontario Provincial Police to develop an electronic pool of real-time information on traffic incidents, highway construction, lane closures and other relevant factors, and provide an appropriate information feed that private sector partners can incorporate into traveler information systems.
- Work with public and private sector partners to develop a transportation information database for the GTA. Use the warehouse to spur the development of one or more centres for regional transportation operations in the GTA/Golden Horseshoe region, while encouraging private sector partners to deploy additional traveler information services.
- Work with public and private sector partners to demonstrate the feasibility and results of linking private sector automated collision detection systems with emergency response systems operated by the public sector.
- Undertake research on alternative technologies with potential for real-time traffic monitoring, and develop alternative incident detection/confirmation algorithms for highway operations.
- Work with a broad range of transportation stakeholders to develop a human factors framework that can help evaluate the implications and effects of in-vehicle technologies on drivers.
- Work with public sector partners to expand Ontario's road and weather condition monitoring system, to enhance highway maintenance operations and improve road user safety.
- Work with private sector partners to expand maintenance fleet monitoring activities to help improve maintenance operations and allow performance and environmental audits.

**Safe, efficient and predictable travel times for commercial vehicles will keep Ontario's economy strong and competitive, while maintaining jobs.**

*Strategies*

- Support the development of an Integrated Electronic Pre-Clearance System at selected border crossings and truck inspection systems to enhance the safety and efficiency of commercial truck traffic.
- Support initiatives that will enhance the GTA's role as an important continental distribution hub that accommodates some 250 million truck movements annually, including initiatives to enhance supply chain logistics that originate or terminate in the area.
- Work with public and private sector partners to evaluate on-board monitoring devices for commercial vehicles that can enhance vehicle safety and driver performance.
- Work with the federal and provincial Privacy Commissioners, as well as various industry and U.S. counterparts to respond to U.S. actions on a Transportation Worker ID Card, and assess opportunities for the use of smart card technology in Ontario.

**Transit will become a more convenient and desirable transportation option for millions of daily commuters.**

*Tactics:*

- Support efforts by transit companies in the GTAH to offer a flexible, region-wide, e-ticket card for transit that allows them to integrate services and boost ridership.
- Support the deployment of advanced ITS technology for fleet management, maintenance and vehicle location tracking, and real-time technology with the broader network of transportation related information systems.

**A growing consumer market for transportation products and services will help expand Ontario's ITS industry.**

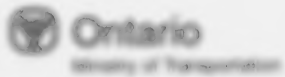
*Tactics:*

- Create a strategic alliance with ITS Canada to increase Ontario's participation in planning, research and industry development activities with the private and other public sector organizations.
- With the cooperation of a co-operating Ontario university, use the strategic alliance described above to assist the development of a provincial ITS vision and business plan to ensure the development of a province-wide ITS training program. One of the current key challenges with the deployment of advanced ITS and its accommodation within the existing transportation infrastructure, including with those in the undergraduate level.
- Work with industry, where international issues such as the annual ITS World Congress can help market the achievements and capabilities of Ontario's ITS private sector.
- Work with ITS Canada to identify standards that are vital to the future success of Ontario's right to ITS industry with recommendations on which standards Ontario should actively help to develop.

**Working with many partners, Ontario will use the proven benefits of ITS to pursue an efficient, well balanced and integrated transportation system.**

*Tactics:*

- Using the ITS Architecture for Canada and relevant upgrading activities from the U.S., develop a regional model architecture for Ontario ITS architecture, in cooperation with other public and private sector stakeholders. Architecture provides a regional architecture with consideration and adoption of ITS technologies throughout the province and help identify strategic regional standards that require development.
- Work with municipal partners to develop a regional operations approach to the management of traffic, maintenance, emergency services and public transit.
- Work with Environment Canada, other provinces, authorities in the U.S. and the private sector to develop a reliable system to forecast road conditions.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